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| 09/882,283      | 06/14/2001  | Xiaopeng Chen        | 020945-001510US     | 7871             |

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EXAMINER

TORRES, JOSEPH D

ART UNIT PAPER NUMBER

2133

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/882,283

Applicant(s)

CHEN ET AL.

Examiner

Joseph D. Torres

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>08/25/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 2-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2, 15 and 29-32 recite, "soft decision information **based on** at least one observed signal" [Emphasis Added]. The term "based on" is indefinite since the term does not set forth the basis of the relationship between soft decision information and at least one observed signal.

2. Claims 2-32 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. Claims 2, 15 and 29-32 recite, "soft decision information **based on** at least one observed signal" [Emphasis Added]. The omitted elements are: the relationship between soft decision information and at least one observed signal. As a result, the connection between "at least one observed signal" and the limitations in the body of the claim is indefinite.

Claims 29 and 30 recite, "A system for updating soft decision information based on at least one observed signal" [Emphasis Added].

There is no means recited in the body of claims 2 and 15 indicating how soft decision information is updated specifying any relationship to at least one observed signal.

3. Claims 2-32 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. Claims 2 and 15 recite, "A method for updating soft decision information based on at least one observed signal" [Emphasis Added].

There is no step recited in the body of claims 2 and 15 indicating how soft decision information is updated specifying any relationship to at least one observed signal.

4. Claims 31 and 32 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. There is no structure recited in the body of claims 31 and 32 indicating how soft decision information is updated specifying any relationship to at least one observed signal.

### ***Response to Arguments***

5. Applicant's arguments filed 08/25/2005 have been fully considered but they are not persuasive.

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The Applicant contends, "Claims 2-32 are rejected under § 112, second paragraph, as being indefinite. Applicants earnestly thank the Examiner for providing suggested amendments for claims 2, 15, and 29-32 to improve clarity and definiteness. Applicants have amended claims 2, 15, and 29-32 according to the Examiner's suggestions and believe that with these amendments, claims 2-32 overcame the rejections under § 112". The Examiner withdraws the previous § 112, second paragraph indefiniteness rejection of claims 2, 15, and 29-32.

The Applicant contends, "Claims 2-32 are rejected under § 112, second paragraph, as incomplete for omitting essential structural cooperative relationships of elements. Specifically, the Examiner indicates that such relationship has not been established between "digital information" and "higher confidence information." As amended, claims 2-32 no longer recite "digital information" and therefore overcome the rejection". The Examiner withdraws the previous § 112, second paragraph incompleteness rejections of claims 2, 15, and 29-32.

The Applicant contends, "Claims 2-30 are rejected under § 101 as being directed to non-statutory subject matter. As currently amended, claims 2-30 recite methods and systems for updating soft decision information based on at least one observed signal into higher confidence information. The recited methods and systems fall squarely within the statutorily defined categories of "process" and "machine," respectively, which are patentable under 35 U.S.C. § 101. Furthermore, because claims 2-30, as amended,

are directed to methods and systems for updating soft decision information based on an observed signal, they are not directed to "an abstract algorithm performed on the basis of an abstract;" which the Examiner has indicated would constitute non-statutory subject matter. Applicants respectfully submit that claims 2-30 as currently amended are directed to statutory subject matter and therefore overcome the rejection".

In response to applicant's arguments, the recitation "at least one observed signal" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The Examiner asserts that the body of claims 1, 15 and 29-32 are still an abstract algorithm that can be carried out by hand or by a computer program. Computer programs are non-statutory. Abstract algorithms are non-statutory.

The Applicant contends, "Claims 2-32 are rejected under § 101 as lacking patentable utility, because the claims supposedly fail to set forth a relationship between "digital information" and "higher confidence information. As amended, claims 2-32 no longer recite "digital information" and overcome the rejection for at least that reason.

In addition, claims 2-32 as amended also clearly set forth the relationship between "higher confidence information" and other recited terms. Specifically, "higher confidence information" is clearly idled as the result of updating "soft decision information," which in turn is based on "at least one observed signal."

Clearly, the updating of soft decision information based on an observed signal into higher confidence information has useful, practical applications. One of these application is the implementation of a data communication system in which transmitted symbols must be decoded based on an observed signal, as described in the present application at pp. 4-5. Updating of soft decision information on such symbols into higher confidence information allows decisions on the symbols to be made with greater accuracy and less error, which improves the performance of the data communication system. Of course, other applications such as data storage systems also exist. Thus, claims 2-32, as currently amended, provide significant patentable utility and overcome the rejection".

In response to applicant's arguments, the recitation "at least one observed signal" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The Applicant contends, "Cheng discloses a reduced-state trellis representation algorithm in which the processing of a backward recursions is dependent on the processing of a forward recursion. The Examiner alleges that Fig. 6 of Cheng shows a backward recursion (steps 74-80) performed independently of a forward recursion (steps 66-72). However, upon closer inspection of the description of Fig. 6, it is revealed that the backward recursion performed at step 74 implements equation 24 or equation 37, both of which explicitly require results produced by the forward recursion, See Cheng, col. 14, lines 6-8 ('The second loop 64 begins at a block 74 that performs the backward recursion. The backward recursion implements equation 24 (37) for each state  $i$ .'); col. 10, lines 8-10 ('That is, the backward recursion does not hypothesize feedbacks and instead re-uses the modified received sequence  $r_n^{(i)}$  computed by the forward recursion.') (describing equation 24); and col. 12, lines 54-56 ('That is, the backward recursion does not hypothesize feedbacks and instead re-uses the modified received sequence  $r_n^{(i)}$  computed by the forward recursion.') (describing equation 37). Thus, the disclosure of Cheng, including Fig. 6 cited by the Examiner, clearly teaches a backward recursion that is dependent on a forward recursion".

The Applicant's remarks are absurd. The forward recursion of equations 20 and 33 in Cheng use  $r_n^{(i)}$  of equation 19 in col. 9 of which is the estimated received signal after decision feedback equalization. It computed prior to calculating forward recursion  $\alpha$  metrics in equations 20 and 33. Nowhere does Cheng teach that the  $r^{(i)}$  of equation 19 depend on the forward recursion  $\alpha$  metrics in equations 20 and 33. Cheng only



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teaches that the  $r_n^{(i)}$  of equation 19 depend on the received signal  $r_n$ , the transmitted signal  $x_i(n-l)$  and fading coefficients  $h_i$ . Cheng teaches that the  $r_n^{(i)}$  of equation 19 are required for calculation of the forward recursion  $\alpha$  metrics in equations 20 and 33 and even if they are calculated in an forward recursion module since they are required for the calculation of the forward recursion  $\alpha$  metrics, they are passed to the backward recursion calculation module unmodified and unaffected by the forward recursion calculations of equations 20 and 33. Nowhere in the Cheng patent, does Cheng teach that the  $r_n^{(i)}$  of equation 19 depend from forward recursion  $\alpha$  metrics in equations 20 and 33, but instead teaches that both forward recursion  $\alpha$  metrics in equations 20 and 33 and backward recursion  $\beta$  metrics in equations 24 and 37 depend from the same  $r_n^{(i)}$  of equation 19; hence the backward recursion  $\beta$  metrics in equations 24 and 37 are independent of forward recursion  $\alpha$  metrics in equations 20 and 33.

The Examiner disagrees with the applicant and maintains all rejections of claims 2-32. All amendments and arguments by the applicant have been considered. It is the Examiner's conclusion that claims 2-32 are not patentably distinct or non-obvious over the prior art of record in view of the references, Cheng; Jung-Fu (US 6658071 B1), Ross; John Anderson Fergus et al. (US 6128765 A, hereafter referred to as Ross), Crozier; Stewart et al. (US 6145114 A) and Benedetto et al. (S. Benedetto, G. Montorsi, D. Divsalar and F. Pollara in "Soft-Output Decoding Algorithms in Iterative Decoding of Turbo Codes," The Telecommunications and Data Acquisition Progress Report, Jet Propulsion Laboratory, California Institute of Technology, vol. 42-124, pp. 63-87,

February 1996) as applied in the last office action, filed 04/05/2005. Therefore, the rejection is maintained.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 2-32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

See the Non-Final Action filed 04/05/2005 for detailed action of prior rejections.

In addition, the Applicant contends, "Claims 2-30 are rejected under § 101 as being directed to non-statutory subject matter, As currently amended, claims 2-30 recite methods and systems for updating soft decision information based on at least one observed signal into higher confidence information. The recited methods and systems fall squarely within the statutorily defined categories of "process" and "machine," respectively, which are patentable under 35 U.S.C. § 101. Furthermore, because claims 2-30, as amended, are directed to methods and systems for updating soft decision information based on an observed signal, they are not directed to "an abstract algorithm performed on the basis of an abstract;" which the Examiner has indicated would constitute non-statutory subject matter. Applicants respectfully submit that claims 2-30 as currently amended are directed to statutory subject matter and therefore overcome the rejection".

In response to applicant's arguments, the recitation "at least one observed signal" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The Examiner asserts that the body of claims 1, 15 and 29-32 are still an abstract algorithm that can be carried out by hand or by a computer program. Computer programs are non-statutory. Abstract algorithms are non-statutory.

7. Claims 2-32 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility.

See the Non-Final Action filed 04/05/2005 for detailed action of prior rejections.

In addition, the Applicant contends, "Claims 2-32 are rejected under § 101 as lacking patentable utility, because the claims supposedly fail to set forth a relationship between "digital information" and "higher confidence information. As amended, claims 2-32 no longer recite "digital information" and overcome the rejection for at least that reason.

In addition, claims 2-32 as amended also clearly set forth the relationship between "higher confidence information" and other recited terms, Specifically, "higher confidence

information" is clearly idled as the result of updating "soft decision information," which in turn is based on "at least one observed signal."

Clearly, the updating of soft decision information based on an observed signal into higher confidence information has useful, practical applications. One of these application is the implementation of a data communication system in which transmitted symbols must be decoded based on an observed signal, as described in the present application at pp. 4-5. Updating of soft decision information on such symbols into higher confidence information allows decisions on the symbols to be made with greater accuracy and less error, which improves the performance of the data communication system. Of course, other applications such as data storage systems also exist. Thus, claims 2-32, as currently amended, provide significant patentable utility and overcome the rejection".

In response to applicant's arguments, the recitation "at least one observed signal" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. Claims 2, 4-15 and 17-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng; Jung-Fu (US 6658071 B1) in view of Ross; John Anderson Fergus et al. (US 6128765 A, hereafter referred to as Ross).

See the Non-Final Action filed 04/05/2005 for detailed action of prior rejections.

Claims 3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng; Jung-Fu (US 6658071 B1) and Ross; John Anderson Fergus et al. (US 6128765 A, hereafter referred to as Ross) in view of Crozier, Stewart et al. (US 6145114 A, hereafter referred to as Crozier).

See the Non-Final Action filed 04/05/2005 for detailed action of prior rejections.

Claims 31 and 32 are rejected under 35 U.S.C. 103(é) as being unpatentable Cheng; Jung-Fu (US 6658071 B1) in view of Benedetto et al. (S. Benedetto, G. Montorsi, D. Divsalar and F. Pollara in "Soft-Output Decoding Algorithms in Iterative Decoding of Turbo Codes," The Telecommuinications and Data Acquisition Progress Report, Jet Propulsion Laboratory, California Institute of Technology, vol. 42-124, pp. 63-87, February 1996) in further view of Ross; John Anderson Fergus et al. (US 6128765 A, hereafter referred to as Ross).


See the Non-Final Action filed 04/05/2005 for detailed action of prior rejections.

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**JOSEPH TORRES  
PRIMARY EXAMINER**

Joseph D. Torres, PhD  
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Art Unit 2133